Math Practice

Problems 1-3 - Solve the equation for x using the following techniques: (a) symbolically with paper and pencil, (b) using the SageMath software, and (c) graphically by setting the left-hand-side equal to y_1 and the right-hand-side equal to y_2 and seeing where the two lines intersect.

1)
$$10 - 5(x+3) = 3x - 9$$

Solution -

(a) Distribute the -5 to the x and the 3:

$$10 - 5x - 15 = 3x - 9$$

Bring like terms to the same side of the equation and combine them:

$$4 = 8x$$

Divide both sides by 8:

$$x = \frac{1}{2}.$$

(b) Run the following SageMath script:

(c) Run the following SageMath script:

```
p1 = plot(y1, (x, 0, 2), color="red")
p2 = plot(y2, (x, 0, 2), color="blue")
g = Graphics()
g += p1
g += p2
g.show()
```

2)
$$\frac{6}{x+2} + \frac{2}{x-4} = \frac{-7}{x^2 - 2x - 8}$$

$$3) x^2 + 5x = -1$$

4) Find an equation for the line that passes through the points (-2,3) and (6,7).

Problems 5-6 - Solve the system of equations using the following techniques: (a) symbolically with paper and pencil, and (b) using the SageMath software.

5)
$$3.5x + 4.1y = -18$$
, $6.2x - 11.5y = 30$

Solution -

(a) Solve the first equation for y:

$$y = \frac{-18 - 3.5x}{4.1}$$

Plug this into the second equation:

$$6.2x - 11.5\left(\frac{-18 - 3.5x}{4.1}\right) = 30$$

Solve this for x:

$$x = -1.28$$

Now use this x to solve for y:

$$y = \frac{-18 - 3.5(-1.28)}{4.1} = -3.30.$$

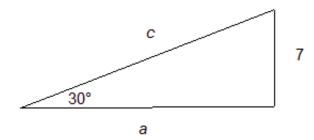
(b) Run the following in SageMath:

$$x, y = var("x, y")$$

 $solve([3.5*x + 4.1*y == -18, 6.2*x - 11.5*y == 30], x, y)$

6)
$$55.3x - 12.5 = 9.7y + 3.1$$
, $5.2y = 8.8x - 22.6$

7) Find the unknown sides and angle of the right triangle shown below.



8) A pole leans away from the sun at an angle of 7° to the vertical, as shown below. When the elevation of the sun is 55° , the pole casts a shadow 42 feet long on the level ground. How long is the pole? Round the answer to the nearest tenth.

